

# Effect of Chronic Peritoneal Fluid Eosinophilia on Peritoneal Membrane Function

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A. Ahsan Ejaz, Raja I. Zabanch, Ten Ridlon, Walter Durkin, Tariq Siddiqui ( Department of Medicine, Halifax Medical Center, Daytona Beach, Florida, USA. )

## Abstract

This study was undertaken to evaluate the effects of long-term persistent peritoneal fluid eosinophilia on the peritoneal membrane as reflected by a change in dialysis function. This was a prospective study undertaken at a community-based peritoneal dialysis unit, where thirty-one patients were enrolled over a 9-month period. Chronic, long-term peritoneal fluid eosinophilia was noted in 12/31 (38.7%) patients. Significant differences were not noted between values of creatinine clearance, DIP urea and Kt/V, compared to their baseline values. This study shows that long-term peritoneal fluid eosinophilia does not significantly affect peritoneal membrane function in patients on maintenance peritoneal dialysis (JPMA 48:233, 1998).

## Introduction

The finding of an abnormally high number of eosinophils in the peritoneal fluid of patients receiving maintenance peritoneal dialysis is a curious phenomenon, the cause and importance of which are still not fully understood. Classically peritoneal fluid eosinophilia (EP) has been noted in a restricted number of diseases, most notably, helminthic infections and allergic diseases. However, EP has been shown to be a rather common event that occurs irregularly and intermittently during the course of peritoneal dialysis in the absence of known clinical entities characterized by eosinophilia<sup>1,2</sup>. Various factors including plasticizers in tubings<sup>3</sup>, use of ethylene oxide sterilized tubings<sup>4</sup>, blood entering the peritoneal cavity during the catheter placement<sup>5</sup>, an allergic reaction to intraperitoneally administered antibiotics or heparin and inadvertent introduction of air into the peritoneal cavity<sup>6</sup> have been implicated in EP. Despite the uncertainty of the etiology and occasionally enticing the unwary clinician to make an incorrect diagnosis of bacterial peritonitis due to the cloudy peritoneal effluent, short-term EP does not seem to have permanent adverse effects upon the peritoneal membrane function as judged by urea and creatinine clearances, dialysate protein content and ultrafiltration capacity of the membrane<sup>7</sup>.

Chronic hypersensitivity reactions and conditions of local eosinophilia such as pulmonary eosinophilic syndromes have been associated with various degrees of tissue damage. Whether such tissue damage occurs in the peritoneum and hence, impairment of peritoneal function in peritoneal dialysis patients exposed to long-term EP remains uncertain. We studied the effect of chronic EP on peritoneal membrane as reflected by a change in dialysis function.

## Patients and Methods

Thirty-one patients on peritoneal dialysis for chronic renal failure, of whom none had peripheral blood eosinophilia, were included in the study. Patients with recent onset of peritonitis of less than 8 weeks prior to the beginning of study

were excluded, as were those who developed peritonitis during the study period. None of the patients had known clinical entities associated with eosinophilia.

All patients had a complete blood count, routine renal function tests, peritoneal fluid cell count

analysis, peritoneal equilibration test (PET) and creatinine clearance tests performed at the onset of inclusion into the study. These tests were then serially performed monthly during the period under investigation. "Chronic peritoneal fluid eosinophilia" were defined by us as an eosinophil count of 10% or more when the total white blood cell count was at least 40/mm<sup>3</sup>, for a period of at least three months. Comparisons were made between data obtained at baseline (pre) to those obtained at end of study (post) using the unpaired t-test. Data are generally expressed as mean±SEM.

## Results

Twelve of the 311 patients met the criteria for chronic peritoneal fluid eosinophilia. The mean age of these patients was 63±2.1 years. Five were females and 7 males. The mean duration of EP was 5.2±1.1 months.

**Table. Effect of EP on urea and creatinine clearance.**  
(n=12)

	Pre	Post	P value
Cl Cr (ml/min)	90±48.2	72.7±20.5	>0.05
D/P urea	0.78±0.12	0.83±0.08	>0.05
Kt/V	2.03±0.6	2.29±0.34	>0.05

Cl Cr= Creatinine clearance

D= Dialysate, P = Plasma

K= Clearance, t = time, V = Volume of distribution.

As shown in Table in patients with EP, there were no significant differences between the pre and post values with respect to creatinine clearance, total urea clearance, values factored for urea distribution space (Kt/V) (K Clearance, t time and v= volume of distribution) and D/P (D= Dialysate and P= Plasma) urea. There were no differences between these same parameters when compared to patients without peritoneal fluid eosinophilia (~P>0.05).

## Discussion

The role of eosinophils in the peritoneum of peritoneal dialysis patients is unclear. The eosinophils, by virtue of their multiple functional capabilities and interactions with lymphocytes and endothelial cells, may play a distinct role in the pathogenesis of allergic and inflammatory diseases. Eosinophils produce a variety of cationic proteins and growth factors that could contribute to vascular injury<sup>9</sup> and a recent study indicates that eosinophils may be involved in the proliferation of vascular smooth muscle in the obliterative arteriopathy of chronic vascular rejection of renal allografts<sup>10</sup>. Whether peritoneal fluid eosinophilia contributes to peritoneal tissue damage which may result in functional impairment in the peritoneal dialysis patients is unknown. In this study we have been unable to demonstrate that a three month duration of peritoneal fluid eosinophilia has clinically significant deleterious effects on the peritoneal function in peritoneal dialysis patients.

The mechanism of eosinophil accumulation in the peritoneum is uncertain. Cellular accumulation at

any tissue site is due to increased cellular ingress or decreased cellular egress. Visceral eosinophilia is generally due to augmented cumulative interplay of many molecules and pathways<sup>11</sup>. While this could be the operative mechanism in our patients, peritoneal eosinophilia could be due to a reduced egress of eosinophils from the peritoneum. Generally, peripheral blood cells circulate through defined pathways. The circulatory patterns of lymphocytes, red cells and neutrophils is clear but the eosinophilic path remains unknown. If the eosinophil pathway involves peritoneal transit, accumulation of eosinophils could occur through damage to the peritoneal membrane. Peritoneal dialysis may alter the peritoneal membrane, through an undefined mechanism and limit the egress of eosinophils from the peritoneum. Eosinophils could circulate into the peritoneum but due to inhibition of egress, could lead to peritoneal eosinophilia.

Eosinophils are extremely susceptible to mechanical damage. Peritoneal dialysis and storage of peritoneal fluid may damage and destroy peritoneal eosinophils, giving rise to artificially low counts. This among others, could account for the irregular nature of eosinophilia in the peritoneal dialysis patients.

Current knowledge of the eosinophil and its pathways limits our understanding of peritoneal fluid eosinophilia. Why eosinophils should occur in the setting of peritoneal dialysis is unclear at this time. Our observations over a three month period found no adverse events from this clinical phenomenon. Perhaps a period of observation longer than three months is needed to evaluate the functional effects of peritoneal fluid eosinophilia.

## References

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